

MANAGEMENT OF WATERHEMP WITH SOIL-APPLIED FOLLOWED BY POSTEMERGENCE HERBICIDES IN ROUNDUP READY® SUGARBEET AT HERMAN, MN IN 2013

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The objective of this study was to determine the effectiveness of soil-applied followed by postemergence herbicides on control of glyphosate-resistant and -susceptible waterhemp populations and the impact on sugarbeet yield and extractable sucrose.

MATERIALS AND METHODS

Urea fertilizer was applied at 143 lbs/A and incorporated with a Kongskilde 's-tine' field cultivator equipped with rolling baskets on May 10, 2013. 'Crystal 875RR' sugarbeet was seeded 1.25 inches deep in 22 inch rows at 60,825 seeds per acre on May 13. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 15G insecticide at 6 pounds product per acre was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 13, June 6 & 27, and July 10. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 40 psi to the center four rows of six row plots 30 feet in length. Preplant-incorporated (PPI) treatments were incorporated 1.5 inches deep with a John Deere 8-foot 's-tine' field cultivator equipped with a spring-tooth harrow. Cercospora leaf spot was controlled with Proline at 5.7 fl oz/A, Inspire XT + Topsin at 7 + 10 fl oz/A, and Headline at 9 fl oz/A broadcast July 18, August 13 and 19, respectively. Sugarbeet was harvested September 18 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet was collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Sugarbeet stand was counted in the center two rows of plots on June 28 and September 18. Sugarbeet injury was evaluated on June 6. Waterhemp control was evaluated on June 6, July 23, and September 5. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.5.0 software package.

Table 1. Application Information

Application code	A	B	C	D	E
Date	May 13	May 13	June 6	June 27	July 10
Time of Day	3:00 P	4:00 P	12:00 P	9:30 A	11:30 A
Air Temperature (F)	86	86	59	76	76
Relative Humidity (%)	29	29	58	45	56
Wind Velocity (mph)	5	5	6	10	3
Wind Direction	WSW	WSW	N	NW	NW
Soil Temp. (F at 6")	57	57	55	75	71
Soil Moisture	Fair	Fair	Good	Good	Good
Cloud Cover	50	50	100	5	40
Sugarbeet stage (avg)	PPI	PRE	cot-2 lf	12 lf	16 lf

SUMMARY

Three applications of Roundup PowerMax (glyphosate; 4.5 lbae/gal) gave 88% waterhemp control at the September 5 evaluation. This level of control indicates the presence of some glyphosate resistant waterhemp. The addition of Betamix (desmedipham + phenmedipham; 0.65 + 0.65 lbai/gal), Ethofumesate 4SC (ethofumesate; 4 lbai/gal), and Destiny HC (a high surfactant methylated seed oil concentrate) to glyphosate increased waterhemp control to 95%. The addition of Outlook to the PowerMax+Ethofumesate+Betamix tank-mix did not significantly improve waterhemp control. Outlook was applied too late in the growing season to provide a measurable benefit. Outlook must be applied prior to waterhemp emergence. The application of a soil herbicide, regardless of rate tested, followed by three PowerMax applications gave 98% to 100% waterhemp control. Timely rains allowed for excellent herbicide activation and reduced rates of preemergence or pre-plant incorporated herbicide gave waterhemp control similar to full rates. In drier conditions it is questionable if reduced rates of these soil-applied herbicides would perform as well as the full rates.

No significant sugarbeet injury was observed by any herbicide treatments throughout the season. No difference was observed in sugarbeet stand at either date evaluated. Sugarbeet treated with herbicide did show significantly greater yield and extractable

sucrose per acre compared to the untreated check. There were some differences in yield and extractable sucrose among herbicide treatments, but it is uncertain as to what caused these differences. These differences appear random and may be caused by soil and environmental variability rather than from weed competition or herbicide injury.

Table 2. Management of Waterhemp with Soil-Applied Followed by Postemergence Herbicides in Roundup Ready® Sugarbeet – Herman, MN – 2013 (Carlson).

Trt No	Treatment Name	Rate	Appl Unit	Appl Code	June 6			July 23		Sept 5	June 28		September 18		
					sgbt Inj	colq cntl	wahc cntl	wahc cntl	wahc cntl	sgbt stand	sgbt stand	sgbt yield	sgbt suc	sgbt ext suc	
					-----%					---no./100 ft---		ton/a	%	lb/a	
1	RU PowerMax N Pak AMS NIS	32 / 24 / 22 fl oz/a	oz/a	C/D/E	0	0	0	92	88		215	208	26.3	16.8	8184
2	RU PowerMax Ethofumesate N Pak AMS Destiny HC	32 / 24 / 22 fl oz/a	oz/a	C/D/E	0	0	0	94	87		228	221	27.5	16.3	8302
3	RU PowerMax Betamix Ethofumesate N Pak AMS Destiny HC	32 / 24 / 22 fl oz/a	oz/a	C/D/E	0	0	0	98	95		223	222	24.7	17.0	7747
4	RU PowerMax Betamix Outlook Ethofumesate N Pak AMS Destiny HC	32 / 24 / 22 fl oz/a	oz/a	C/D/E	0	0	0	99	97		215	220	22.9	16.9	7145
5	Ro-Neet SB RU PowerMax N Pak AMS NIS	3.6 pt/a	pt/a	A	0	90	78	99	98		225	216	27.8	17.0	8744
6	Ro-Neet SB RU PowerMax Ethofumesate N Pak AMS Destiny HC	3.6 pt/a	pt/a	A	1	83	83	100	99		224	212	26.5	16.8	8217
7	Ro-Neet SB RU PowerMax Betamix Ethofumesate N Pak AMS Destiny HC	3.6 pt/a	pt/a	A	0	53	70	100	100		225	214	23.3	16.8	7296
8	Ro-Neet SB RU PowerMax Betamix Outlook Ethofumesate N Pak AMS Destiny HC	3.6 pt/a	pt/a	A	0	88	90	100	100		226	208	26.2	16.7	8093
9	Ro-Neet SB RU PowerMax N Pak AMS NIS	5.3 pt/a	pt/a	A	1	95	95	98	99		222	214	24.6	17.1	7783
10	Ro-Neet SB RU PowerMax Ethofumesate N Pak AMS Destiny HC	5.3 pt/a	pt/a	A	1	88	90	100	100		232	214	26.7	16.7	8285

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Trt No	Treatment Name	Rate	Appl Code	June 6			July 23		Sept 5	June 28		September 18		
				sgbt Inj	colq cntl	wahc cntl	wahc cntl	wahc cntl	sgbt stand	sbgt stand	sgbt yield	sgbt suc	sgbt ext suc	
				-----%			-----		---	no./100 ft---		ton/a	%	lb/a
	Destiny HC	1.5 pt/a	CDE											
21	Ethofumesate	5 pt/a	A	1	73	75	100	99	225	217	26.7	16.9	8341	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	N Pak AMS	2.5 % v/v	CDE											
	NIS	0.25 % v/v	CDE											
22	Ethofumesate	5 pt/a	A	1	95	98	100	100	228	215	26.6	16.8	8279	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
23	Ethofumesate	5 pt/a	A	1	50	75	100	100	217	212	27.8	16.2	8311	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Betamix	10 / 16 / 24 fl oz/a	C/D/E											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
24	Ethofumesate	5 pt/a	A	0	89	84	100	100	221	216	24.3	17.0	7717	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Betamix	10 / 16 / 24 fl oz/a	C/D/E											
	Outlook	21 fl oz/a	D											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
25	Ethofumesate	7.5 pt/a	A	1	68	98	100	100	222	215	25.6	16.5	7761	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	N Pak AMS	2.5 % v/v	CDE											
	NIS	0.25 % v/v	CDE											
26	Ethofumesate	7.5 pt/a	A	0	100	100	100	100	221	214	27.0	16.9	8467	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
27	Ethofumesate	7.5 pt/a	A	0	93	100	100	100	231	215	25.1	17.3	8061	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Betamix	10 / 16 / 24 fl oz/a	C/D/E											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
28	Ethofumesate	7.5 pt/a	A	0	93	98	100	100	227	217	27.1	16.7	8331	
	RU PowerMax	32 / 24 / 22 fl oz/a	C/D/E											
	Betamix	10 / 16 / 24 fl oz/a	C/D/E											
	Outlook	21 fl oz/a	D											
	Ethofumesate	4 fl oz/a	CDE											
	N Pak AMS	2.5 % v/v	CDE											
	Destiny HC	1.5 pt/a	CDE											
29	Untreated Check			0	0	0	0	0	215	185	15.7	16.8	4892	
		LSD 5%		NS	32.7	25.0	3.0	4.2	NS	NS	5.01	NS	1378	
		CV %		247	32	23	2	3	5	6	14	3	12	